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AMORE

(Auto-Matic Observation REndering)

Ng Y.K., Brogt E., Chiosi C., Bertelli G., 2002, A&A 392, 1129

Main blocks

- PIKAIA (GA by Charbonneau 1995)
- HRD-ZVAR (Padova group)
- HRD-GST (Ng 1994)
- CMD comparison (Ng 1998)
- POWELL minimization (Numerical recipes)

AMORE uses with the combination of PIKAIA and POWELL a hybrid minimization strategy

Fitness evaluation

$$f = \frac{1}{1+F} \quad (1)$$

$$F = F_\chi^2 + F_P^2 \quad (2)$$

$$F_\chi = \sqrt{\chi^2(O,S)/N_{match}} \quad (3)$$

$$F_P = \frac{N_{O,not} + N_{S,not}}{\sqrt{N_O} + \sqrt{N_S}} \quad (4)$$

- Uncertainty

$$f_{\sigma,k} = \frac{1}{1 + |\sqrt{F_k} - \sqrt{F_{min}} - 1|} \quad (5)$$

PIKAIA parameters

- individuals per populations (100)
- number of generations (20)
- digits encoding accuracy
- mutation mode
- mutation rate(s)
- fitness differential
- reproduction plan
- elitism

extended PIKAIA parameters

- multi-point crossover
- brood recombination
- creep mutation
- correlated mutation

Fit parameters

- distance
- extinction
- lower age limit
- lower metallicity limit
- slope of the power-law IMF
- upper age limit
- upper metallicity limit
- index of the exponential SFR

Search for an optimum set of parameters via a dynamic, scalable parameter space. Shrinking of the parameter space occurs after each optimization cycle with POWELL.

Future work

- develop and tests additional optimization paths
  - BUTTERFLY (Back-end UTiliTy to Estimate the Remaining Fitness by Leaping & Yachting)
  - distance (best–median) based mutation probability (PIKAIA 1.2)
- develop a multi-population version
- add more galactic structure
- upgrade ZVAR
- tests
  1. globular clusters,
  2. galactic structure,
  3. open clusters, and
  4. dwarf spheroidal populations.